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ABSTRACT

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Number 67

Does Education Pay in the Labor Market?

The Labor Force Participation, Occupation, and Earnings of Feruvian Women

Elizabeth M. King

The World Bank
Washington, D.C.

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The overall level of female labor force participation in Peru is 72 percent, and this percentage is higher in rural areas than in urban areas. The majority--60 percent--of paid female workers are self-employed, but these jobs tend to be very lowpaying. Women holding jobs in the public sector (either in state corporations or the government) are the best paid.

In general, education and training enhance the contribution of women in the labor market. Although education does not increase the participation of Peruvian women in the labor force (and may in fact decrease it), it alters the occupational distribution of female workers by increasing the proportion of women in paid employment. Among paid employees, education is positively related to hourly earnings; the relationship is nonlinear, with primary education showing higher returns than secondary education. The return to postsecondary education appears low and negative, except for the small fraction of women who have earned a diploma. The poor performance of the Peruvian economy since the early 1970s has influenced this result.

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INTRODUCTION

The economic role of women in the development process depends in large part on their ability to participate in the labor market. In turn, this ability hinges on their level of training and their skills, on the one hand, and on the availability of work opportunities for them, on the other. In many developing countries, important shifts in attitudes towards women's education and government programs in support of more education have raised schooling levels for women. In Latin American countries, the rise in the women's school enrollment rates during the last two decades has narrowed the education gap between men and women. Whether the rise in women's educational attainment has significantly affected their labor force participation is not clear however. Although labor force participation rates of women are generally increasing, the higher rates are still greatly concentrated in the lower status occupational categories, particularly in the nonwage sector.

This paper examines labor force participation, occupations, and earnings of women in Peru and identifies the determinants of these outcomes, focusing on the effect of education and training. From the mid-1950s through the 1960s, the Peruvian government undertook a major expansion of public education, increasing the number of primary and secondary schools and improving school inputs. One result of these policies is that females' gross enrollment ratios in primary education rose from 65 percent in 1955 to 99 percent in 1970. Although the expansion of school facilities favored the cities, even in rural areas, the education gender gap narrowed markedly throughout this period.

WOMEN'S LABOR MARKET ACTIVITIES AND EARNINGS: PROFILES

The data used in this study are drawn from a comprehensive household-level data set collected jointly by the Peruvian Instituto Nacionál de Estadística (INE) and the World Bank--the Peruvian Living Standards Survey (PLSS). This survey, conducted from June 1985 through July 1986, provides detailed socioeconomic and labor force information on more than 5,000 randomly selected households and their members.[1/] Data on labor market activity were collected through a series of questions asking the respondent, first, about work for an employer who is not a household member and, then, about work on a farm or in an enterprise belonging to the household. The respondent was also asked specifically about work for herself or as an unpaid family worker. The latter question is important because a large fraction of women in Peru remains outside the formal wage sector, many as unpaid family workers. The labor force participation rates of this group could easily be underestimated, particularly for women in rural areas.

The analysis pertains to women aged 20-59 years. Of the 5,648 women in the sample, 31 percent were residing in Lima at the time of the survey, 37 percent were in other urban areas, and 32 percent were in rural areas.

Occupational Distribution by Residence

Figure 1 shows that 72 percent of all women in the sample were in the labor force during the week of the survey. Their participation rate was

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1/ For more details about the survey design, see Grootaert and Arriagada (1986).

highest in rural areas, at 85 percent, and lowest in Lima, at 64 percent.[2/] Labor force participation is defined as any amount of work in paid or unpaid employment. In contrast, the 1981 National Census included unpaid workers in the labor force only if they worked fifteen hours a week or more. As a result of this difference in definition, the census and the PLSS yield very different female labor force participation rates--21 percent and 55 percent, respectively; this is too large a disparity to attribute to the difference in years covered.[3/] In both surveys, women who were not working at the time of the survey but were looking for work were considered labor force participants.

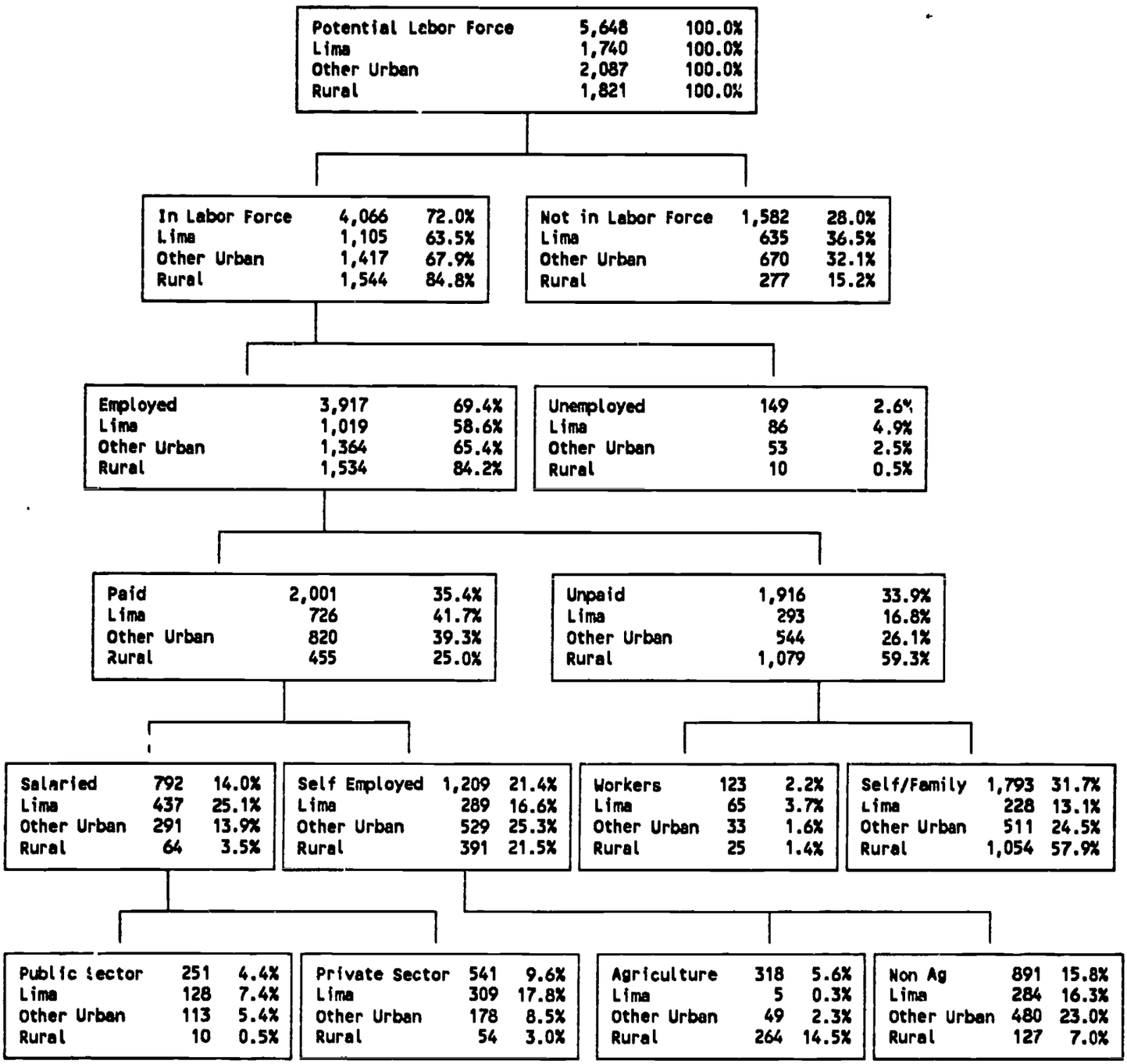
Of those in the labor force, 96 percent were employed. (As figure 1 shows, in the total sample of women, including those in and out of the labor force, about 70 percent were employed.) Employment rates varied greatly between rural women and other women. Eighty-four percent of all rural women were employed compared to 59 percent in Lima and 65 percent in other urban areas. Among employed Lima women, 71 percent reported receiving compensation for their work, but only 25 percent of employed rural women received wages, salaries, and/or payment in-kind. Not being able to observe compensation for almost half of all employed women complicated the task of estimating a wage or earnings function for them.

[2/] The occupation data shown pertain to jobs held in the week prior to the survey. The PLSS also asked whether the job held in the week before the survey was different from that held in the 12 months prior to that period. Of those in the labor force in the last week, more than 10 percent had changed jobs or occupations; of those not in the labor force in the last week, 25 percent had been employed in the 12 months prior to the survey. We include data on wages and earnings for jobs held in the last 12 months in the multivariate analyses in the next sections; hence, the sample of observations numbers 5,777.

[3/] Another possible source of the disparity is the difference in questionnaire design. The census first asks what a person's principal occupation is rather than obtaining a description of the activities engaged in for pay or that contributed to family income. In a study of census data for Cajamarca, Deere (1982) found important differences in women's responses to these two approaches. When women were asked first about their income-generating activities, the majority of rural women appeared to be economically active. When queried first about their occupations, the majority of women reported being housewives. Housewives were classified as not in the labor force.

Figure 1

Distribution of Sample Female Population Ages 20-59 By Main Occupation During the Last Seven Days (Number and percentage of Women aged 20 to 59)



Sixty percent of the paid workers in the sample were self-employed. Self-employment generally included a wide array of activities, ranging from tending a small store to having one's own medical practice. Again, this proportion varies by place of residence. In Lima, 60 percent of paid workers were salaried, while the rest were self-employed. Of the salaried group, 70 percent were employed in the private sector. Nearly all the self-employed workers in Lima were involved in nonagricultural activities. In other urban areas, 35 percent of paid workers were salaried rather than self-employed. More than 60 percent of the wage employees were private-sector workers. Of the self-employed, 90 percent were nonagricultural workers. In rural areas, more than 85 percent of paid workers were self-employed, and of these almost 70 percent were employed in agriculture. Of the salaried workers, 84 percent were employed in the private sector. These patterns suggest the overwhelming importance of self-owned and family enterprises as a source of employment for women, particularly for those residing in rural areas. Private-sector employment is most important for Lima women: more than twice as many women were salaried employees in private firms in Lima as in other urban areas and more than five times as many as in rural areas.

Occupational Distribution by Age Cohort

Table 1 presents women's occupational patterns by age cohort. These patterns reflect two influences on occupation--one pertains to the life cycle, and the other to temporal shifts in the labor market and economy. As long as no remarkable socioeconomic changes occur over time, the age distribution from cross-section data is the best clue to the life-cycle profile of labor force participation and occupation of women. With rapid change in the economy and society, such as shifts in types of occupations or growth in educational levels that influence more women to enter the labor force, cross-section data cannot distinguish between life-cycle and temporal effects. In other words, the more rapidly women are entering the labor market, the less likely is the cross-section profile to yield the true life-cycle profile of participation rates. In particular, cross-section data would underestimate participation at older ages. Without information on work histories, age differences and time differences cannot be disentangled.

For all Peru, labor force participation increases with age up to the cohort 35-44, reaching 77 percent, and then declines for the oldest cohort to 72 percent. Unemployment is highest for the youngest cohort in the labor force, reflecting higher unemployment among first-time job-seekers or students, and smallest for the oldest cohort, probably due in part to lower nonparticipation rates among older women, who are less likely to be employed. The sharp drop in unemployment rates with age also appears to be associated with the rise in self-employment as women become older. Combining the paid and unpaid self-employed, the proportion of women in self-employment is 38 percent for cohort 20-24 and 64 percent for cohort 45-59. This pattern is strikingly similar for urban and rural women.

Table 1

Percentage Distribution of Sample of Women Aged 20-59 Main Occupation in Last Seven Days

Place of residence and age	Not labor force	In labor force						
		Total	Unemployed	Paid				
				Public sector	Private sector	Self-employed	Total	Unpaid
All Peru	28.0	72.0	2.6	9.6	4.4	21.4	35.4	33.9
20-24	38.1	61.9	5.2	13.3	2.6	10.4	26.3	30.4
25-34	26.0	74.0	3.3	12.2	6.6	19.7	38.5	32.2
35-44	23.0	77.0	1.8	8.1	6.4	26.2	40.7	34.5
45-59	27.5	72.5	0.7	5.0	1.4	27.4	33.8	38.1
Lima	36.5	63.5	4.8	17.8	7.4	16.8	42.1	16.8
20-24	41.3	58.7	9.8	24.9	4.9	6.3	36.1	12.9
25-34	29.2	70.8	5.7	21.5	9.5	15.6	46.6	13.5
35-44	31.9	68.1	3.4	14.3	11.1	22.4	47.8	17.0
45-59	48.3	51.7	0.5	8.8	2.4	22.1	33.3	17.9
Other Urban	32.1	67.9	2.5	8.5	5.4	25.3	39.2	26.1
20-24	46.9	53.1	4.2	10.1	1.9	11.3	23.3	25.5
25-34	30.5	69.5	3.0	11.6	8.1	22.3	42.0	24.6
35-44	24.2	75.8	2.2	7.7	8.5	33.7	49.9	23.8
45-59	29.5	70.5	1.0	4.4	2.1	32.6	39.1	30.5
Rural	15.2	84.8	0.5	3.0	0.5	21.5	25.0	59.3
20-24	22.2	77.8	1.0	4.2	1.0	13.9	19.1	57.9
25-34	16.2	83.8	0.8	2.0	1.2	21.3	24.5	58.5
35-44	14.1	85.9	0.0	3.2	0.2	21.5	24.9	61.0
45-59	11.3	88.7	0.5	2.9	0.0	26.0	28.9	59.3

The most notable regional difference is in labor force participation rates. Whereas labor force participation drops for women aged 45-59 in Lima and other cities, it actually increases, though only slightly, for rural women in the same age group. Among women in Lima, participation falls from 68 percent for those aged 35-44 to 52 percent for those aged 45-59; for women in other cities, it drops from 76 percent to 71 percent. Among rural women, however, participation rises from 86 percent to 89 percent. Also noteworthy in rural areas is the increase across age cohorts in the proportion of labor force participants who are paid. In contrast, the proportion of paid workers in Lima and other cities increases up to ages 35-44 but drops thereafter.

Education and Occupation

Table 2 presents the average years of completed education of women, by labor market participation and region of residence. Several interesting facts emerge. One is that the mean educational attainment of those in the labor force is lower than that of women who are not in of the labor force. The difference for the country as a whole is 1.6 years. For women in Lima, the gap is 1.4 years, and for other urban and rural women, 0.9 year. This gap is statistically significant, however, only when considering Lima women aged 45 and older, urban women outside Lima who are 35 years and older, and all rural women. The national pattern reflects the fact that rural women, who are the least educated, have much higher participation rates at all ages than urban women.

Table 2
Average Years of Education of Women Aged 20-59
by Labor Force Participation

Place of residence	Not in labor force	In labor force
All Peru	6.6	5.0
Lima	7.9	6.5
Other urban areas	7.0	6.1
Rural	2.6	1.7

Table 3 shows that paid workers have more years of education, on average, than unpaid workers. The schooling gap is three years for the country as a whole. Much of this gap is due to less educated rural women being employed more in unpaid work.

Table 3
Average Years of Education of Employed Women by Remuneration

Place of residence	All employed	Paid	Unpaid
All Peru	4.9	6.3	3.4
Lima	8.1	8.5	7.2
Other urban areas	6.0	6.7	4.9
Rural	1.7	2.0	1.6

Earnings and Hours of Work

The earnings (expressed in Intis per hour) reported in table 4 are computed from reported compensation in cash or kind in paid employment. They include the value of fringe benefits and other payments such as free housing, food, clothing, and transportation. Hourly earnings are also estimated from reported compensation in self-employment.

Wages of women in the public sector are the highest, while those in self-employment are the lowest. More than half of the self-employed workers receive less than 2 Intis an hour; the median wage among public sector workers is over three times as large as for the self-employed. Not many self-employed women earn more than the majority of government workers; in particular, whereas only 8 percent of self-employed workers earn 8 Intis or more an hour, 32 percent of government workers do.

Table 4
Distribution of Hourly Earnings for Women in Paid Employment by Sector of Employment (percentages)

Intis/hour	Private	Public	Self-employed	Total
All Peru	100	100	100	100
- 2	36	7	56	44
2 - 4	32	17	21	23
4 - 6	14	20	9	12
6 - 8	6	23	6	8
8 - 10	6	17	2	5
10 - 20	5	14	4	5
20+	2	1	2	2

Paid workers work much longer during a week than unpaid workers (table 5). On average, paid employees work almost 40 hours a week compared to 17 hours for unpaid workers. These numbers emphasize the large proportion of unpaid workers who work part-time: 42 percent of them work 20 hours or less a week. Moreover, whereas 42 percent of paid workers work more than hours a week, only 26 percent of unpaid workers do so. Paid workers in private firms work 42 hours on average, compared to 37 hours in government jobs and 3 hours in self-employment. Although the mean work hours in government and self-employment are almost the same, the distributions of work hours in these two sectors are very different. On the one hand, 28 percent of self-employed workers work 20 or fewer hours a week, compared to only 4 percent of government workers. On the other hand, the proportion of self-employed workers working more than 40 hours a week is almost twice that of government employees.

In number of weeks worked a year, the ranking by sector of paid employment is reversed. Women employed in the private sector, on average, worked 34 weeks in the previous year, as compared with 39 and 40 weeks for government and self-employed workers, respectively. On average, the largest

percentages of paid self-employed workers and unpaid workers reported working 48 or more weeks in the year. Their work was more spread out over the year than that of other workers, and it also required fewer hours each week of work.

Table 5
Distribution of Hours and Weeks of Work
of Employed Women by Sector of Employment
(in percentages)

	Paid workers				
Work Time	Private	Public	Self	Total	Unpaid
Mean hours/week	42.09	37.12	36.02	38.82	17.29
(st. dev.)	(16.3)	(8.9)	(25.0)	(19.7)	(20.1)
All employed women	100	100	100	100	100
- 20	10	4	28	20	42
20 - 30	12	27	21	19	19
30 - 40	22	49	12	19	13
40 - 50	34	17	16	22	15
50 - 60	12	2	10	9	7
60+	10	1	13	11	4
Mean weeks/year	34.39	38.75	39.72	37.26	32.70
(st. dev.)	(19.0)	(18.3)	(16.5)	(18.1)	(21.3)
All employed women	100	100	100	100	100
- 16	22	12	10	14	12
16 - 32	18	9	9	11	7
32 - 48	15	16	14	16	11
48+	45	53	67	59	70

Overall Employment Characteristics

Several patterns of labor force participation, education, and earnings emerge from this overview.

1. The overall level of female labor force participation in Peru is high, reaching 72 percent, and it is higher in rural than in urban areas. Because a significant fraction of these employed women are unpaid workers, labor force activities of women are severely underestimated when unpaid work is ignored.

2. Self-employment is a major activity of women--60 percent of paid workers are self-employed--but these jobs tend to be low-paying. (Women holding jobs in the public sector, either in state corporations or the government, are the best paid.) The age distribution of self-employment, if interpreted as showing temporal change, suggests that self-employment has become less important, a result perhaps of the relative expansion of salaried jobs. Assuming that all unpaid workers are also self-employed, 31 percent of those aged 20-24 were (paid or unpaid) self-employed compared to 66 percent of women aged 45-59. The life-cycle interpretation of this age pattern is that self-employment becomes a more dominant activity as women grow older, perhaps because women who leave the labor force to raise their families find reentry into the wage sector difficult. Although self-employed workers tend generally to be less educated, in their later years, self-employed workers tend to have more education than other workers.

3. Simple tabulations suggest that schooling is positively associated with having a paid job. The mean educational level of paid workers is six years compared to three years among unpaid workers.

4. Urban women receive much higher hourly wage rates than rural women, and among urban women, those employed in the public sector have higher wages than other employed women. To determine the reasons for these patterns, the next sections explore the factors that determine labor force participation, paid employment, and earnings.

EMPIRICAL MODEL AND HYPOTHESES

Empirical analysis of data from the PLSS produced estimates for (1) a probit model of women's labor force participation, (2) a probit model of their participation in paid employment, and (3) an hourly earnings function. To examine regional differences more closely, these relationships are estimated separately for Lima, other urban areas, and rural areas.

Underlying the two participation functions is the following regression,

$$P^* = \alpha'X + \mu_1$$

where P* is an unobservable variable reflecting a woman's work-leisure choice, given her market opportunities and her income and time constraints (such as nonlabor income and demands for her time at home). Participation in the labor force reflects net gains from market activities relative to the value of foregone household production and other nonmarket opportunities. X is a vector of individual, household, and community variables that influence participation, and μ_1 is a random error term. Community variables are included because the economic health of the community and its labor market conditions are also likely to affect the work-leisure choice.

One observes a binary variable P, which is equal to 1 if the woman is in the labor market or 0 if she is not; that is,

$$P = 1 \text{ if } P^* > 0$$
$$P = 0 \text{ otherwise.}$$

In the probit specification, $\text{Prob}(P = 1) = \text{Prob}(\mu_1 > -\alpha'X) = 1 - F(-\alpha'X)$, where F, the cumulative distribution function for μ_1, is a standard normal distribution.

We also estimated an hourly earnings function for paid workers for whom we observe positive earnings. Although unemployed and unpaid workers are

not included in the estimation, the earnings relationship should reflect the selection of women into paid and unpaid employment. It would be erroneous to assume that the earnings of unpaid workers would be zero had they been employed as paid workers or that the value of their time is zero. Women enter the labor market when their expected market wage exceeds the opportunity cost of alternative activities. These activities may include nonmarket or household work such as child care.

The earnings function estimated is

$$\ln W = \beta' Z + \delta\lambda + \mu_2,$$

where W is hourly earnings, Z is a vector of characteristics that determine wages, λ is a selectivity bias correction, and μ_2 is a random disturbance term. λ is included in order to correct for the bias incurred from observing hourly earnings only for women employed as paid workers (Heckman, 1979).[4/]

Table 6 defines the explanatory variables included in the participation and earnings functions. The table also shows means and standard deviations for the sample population. (For means by region, see appendix tables B.1 and B.2.)

4/ For example, if education and postschool vocational training are positively related to the disturbance term in the earnings function, then estimating the earnings relationship on the basis only of those who are employed could underestimate the impact of education and training on earnings. Our procedure for estimating the earnings function with the sample selection correction consists of two steps: first, calculating the probability of selection as a paid worker, and secondly, admitting λ as an explanatory variable into the earnings equation. λ is the (Mills) ratio of the standard normal density function, $\phi(\alpha'X)$, to the probability of being selected into the sample.

Table 6
Means and Standard Deviations for Variables in Labor Force Participation and Wage Functions, All Peru

Variables	Participation Mean	Participation S.D.	Wage Function Mean	Wage Function S.D.
In labor force	0.785	0.41		
In paid employment	0.447	0.50		
Log(hourly wage)			0.728	1.35
Age splines:				
ages 20-24	3.585	1.05	3.661	0.95
Ages 25-34	6.573	4.16	6.780	4.02
Ages 35-44	3.778	4.41	3.603	4.30
Ages 45-59	1.820	3.79	1.508	3.40
Years of schooling	5.477	4.64	6.507	4.79
Received a diploma (1,0)	0.058	0.23	0.118	0.32
Received training (1,0)	0.287	0.45	0.392	0.49
Years since training	2.673	6.13	3.555	6.66
Total aged 0-4 in household	0.781	0.93		
Total aged 5-11 in household	1.098	1.15		
Total aged 12-19 in household	1.136	1.23		
Females aged 20-59 in household	0.653	0.96		
Males aged 20-59 in household	1.193	0.85		
Total aged 60+ in household	0.291	0.56		
Spouse's age	26.909	22.32		
Spouse's years of schooling	4.028	4.68		
Spouse's hourly wage (intis)	3.293	25.12		
Annual family remittances (intis)	785.2	3427.6		
Annual unearned income (intis)	1832.6	8684.0		
Married (1,0)	0.660	0.47		
Years in present job (tenure)			7.955	9.75
Job is seasonal (1,0)			0.038	0.19
Belongs to a union (1,0)			0.137	0.34
Has a contract in present job (1,0)			0.110	0.31
Firm is a private enterprise (1,0)			0.237	0.43
Firm is a state enterprise (1,0)			0.015	0.12
Firm is a family enterprise (1,0)			0.055	0.23
Boss is a relative (1,0)			0.031	0.17
Been ill during last 4 weeks (1,0)			0.540	0.50
Lima	0.314	0.46	0.401	0.49
Rural	0.317	0.47	0.201	0.40
Paved, gravel, dirt road (1,0)*	0.242	0.43		
Village mean female wage (intis)*	0.709	0.78	0.704	0.80
Sample size	5777		2584	

Note: (*) indicates that means are provided only for rural sample.

Determinants of Labor Force Participation and Paid Employment

The participation functions include a common set of regressors for age, education, training, marital status, and household composition. Labor force participation is expected to follow a U-shaped profile with age, indicating changes over the life cycle. The shape of this profile is captured by age splines with segments for ages 20-24, 25-34, 35-44, and 45 and up.[5/] Although the life-cycle profile of labor force participation should be estimated using longitudinal instead of cross-section data, work history data were not available, so cross-section results were assumed to approximate that profile.

Paid employment includes any kind of wage employment, whether in the public service or the private sector, and any paid self-employment. Payment may take the form of cash or kind.[6/] Participation in paid employment is likely to have a similar life-cycle profile as labor force participation for several reasons. One is that the factors that influence women's participation in the labor market, such as childbearing and child care, would also affect their choice of occupation. Women with young children who decide to work in the labor market are more likely to choose a job that is compatible with the demands of child care; this might be employment at or near home a job with flexible work hours.

Past studies indicate that education increases labor force participation of women but that this effect is nonlinear, being larger for higher levels of schooling. After exploring alternative specifications of the

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[5/] We tried alternative spline formulations with shorter segments but found them not statistically different from each other.

[6/] In order to avoid a measurement problem due to seasonality, participation is defined over the 12 months prior to the survey. As noted above, 25 percent of women who were not in the labor force in the week previous to the survey reported working sometime during the previous year.

education variable,[7] we included two measures of education: years of school completed (a linear effect); and whether the person has received a postsecondary diploma, which would capture any additional effect of completing higher education.[8]

In addition, the formulation included two variables pertaining to out-of-school training: whether the person had received training, and how many years ago the last spell of training was obtained.[9] Like schooling, out-of-school training is a form of investment in human capital that might be expected to affect both employment and earnings. Although on-the-job training is also such an investment, data limitations prevented its inclusion in the training variable, which is thus limited to training programs (job-related or not) outside of the job. In the sample, 29 percent of women had attended at least one postschool training program. At the mean, the last training spell was undertaken almost three years before the survey.[10]

Lastly, a person's labor market behavior is part of the overall labor supply or time-allocation decisions in the household. Family labor supply models presume that husband and wife jointly determine their labor

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[7] Several spline specifications of years of schooling attained resulted in slopes that were not significantly different from each other.

[8] Mohan (1986) found the diploma variable to be important for men but not for women in Colombia.

[9] We note that whether a woman has received training may not be independent of her labor force participation behavior and hence should be modeled jointly with participation. Women who intend to find work in the labor market are more likely than others to invest in increasing their employable skills through vocational training. The same could be argued with respect to postsecondary education. Admittedly, we are simplifying our analysis somewhat by assuming that training and completion of postsecondary education are predetermined variables.

[10] Very little empirical work has been done on the effects of out-of-school training in developing countries. Jimenez and Kugler (1987) found that in-service job training has a higher rate of return than formal schooling for urban male workers in Colombia--14 percent per year of training compared to 11 percent per year of schooling. Arriagada (1988) found that occupation-based training increases the labor force participation of urban Peruvian women but does not affect their earnings.

supply and leisure, that parents decide how much time a young child will spend at school, and so on. Hence, the age and sex composition of the household, which measures the ratio of potential dependents to potential workers, and thus the latent demand for workers in the family, could affect the labor supply decision of any member. For example, the greater the number of very young children, the greater the demand for income as well as for child care. Whereas the effect of that variable might be to increase the income-earning work of men, it might have the effect of decreasing it for women, who increase child care time instead. Although older children or female adults living at home are potentially substitute sources of child care or home production, the larger number of other adults in the family also could reduce a woman's labor supply. In the sample, about two-thirds of women were married at the time of the survey. Also, on average, each household had two children under 12 years of age.

Determinants of (Hourly) Earnings

The basic premise of the standard wage or earnings function in the economic literature is that earnings variations among individuals arise from differences in the human capital they possess and in their work experience. This model typically equates human capital with education and assumes that earnings are parabolic in the experience variable. In the absence of direct information on work histories, total potential experience has usually been computed as age minus the number of years of schooling minus six (the presumed age of entry into school). This measure is not appropriate for women, however. The demands of marriage and motherhood, discrimination in the workplace, and the tendency to hold temporary jobs all may interrupt women's labor force participation. Our estimated earnings function includes age splines; however, the coefficients of these variables should not be interpreted as the return to work experience. Rather, they simply describe the life-cycle earnings profile of women.

The present analysis differs from past studies on Latin American countries in that it considers simultaneously the effects of different levels and streams of education, out-of-school training, and job characteristics that

measure the demand side of the market.[11] The postschool training variables are specified as in the participation equations, but education enters differently. Our earnings equation allows for the nonlinearity of the rate of return to education by specifying schooling splines with segments corresponding to the three levels of the educational system. Moreover, it differentiates between general and vocational education at the secondary level and between university and nonuniversity education at the tertiary level. Skill formation through vocational and technical education has been an important part of Peru's human-capital investment strategy. The allocation of the government's recurrent secondary education budget to vocational education appears somewhat higher than the mean for developing countries (Moock and Bellew, 1988). Furthermore, there is some evidence, though mixed, that the return to vocational education may be different than that to general education in Latin American countries (Psacharopoulos, 1984; Psacharopoulos and Steier, 1987; Schiefelbein, 1979).

We also examined the additional effect of receiving a diploma that certifies completion of academic requirements at the postsecondary level. The marginal difference in wages attributable to this variable captures its contribution to the person's productivity and/or the value of a diploma as a signal to employers. One interpretation of a diploma effect is the importance of certification, or credentialism, in the labor market. A wage differential between diploma holders and others is not a sufficient test of this hypothesis, however, because the gains from productivity completing a degree program is still confounded with the certificate effect.[12]

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[11] See appendix A for a review of past studies.

[12] Estimates of the returns to education and postschool training from the wage function can be biased for a number of reasons. One of the criticisms of this method is that it tends to exclude the effect of innate ability on productivity. Although attempts have been made to include direct measures of ability (usually based on IQ tests or school grades in some previous research), these measures were not available for our study. Studies in the United States have found that accounting for ability reduces by 15-20 percent the variation in earnings explained by educational differences. Further, measures of "academic" ability may not predict economic performance. Another source of bias is failure to consider differences in the quality of education and training. The present analysis cannot control for this because

In addition, we explored the effect of several job characteristics on earnings. These are sector of employment (whether the job is in the private sector), firm size, whether the job is seasonal, whether the worker has a contract or is a union member, and whether the employer is a relative. Table 4, which does not control for worker characteristics, shows that hourly earnings vary among sectors, with women who hold public jobs appearing to earn the highest wages. This may reflect true job differences, but earnings variation may also prevail among women with similar jobs and characteristics because imperfections in the labor market produce barriers to job mobility that prevent wages from equalizing across similar jobs.

Lastly, place of residence is meant to capture urban-rural differences, with Lima also being distinguished from other urban areas. Some regional disparities are already reflected in observed, systematic differences in the characteristics of women. The place-of-residence variables are meant to capture any residual variation among Lima, other urban, and rural areas. They can measure a wide array of factors, including regional differences in composition and size of the labor market, for which we have no direct measures.

A community survey conducted only in rural areas made two village-level variables possible: whether the village has a road, and the mean agricultural wage for adult female workers. The presence of a road of any type indicates that residents have vehicular access to town or urban market centers and other villages. It is a crude measure of the economic development of a village relative to other villages, and it also reflects the relative

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the database used does not provide appropriate measures of quality. Thirdly, the returns to schooling may be overstated because of what Birdsall and Behrman (1984) call "geographical aggregation bias." Countrywide analyses that do not consider regional differences arising from school-quality differences or differences in labor and product markets can produce biased estimates of returns to education. They found a large geographical aggregation bias in Brazil and in Nicaragua. Considering this, the analysis obtains estimates for the all-Peru sample as well as for Lima, other urban areas, and rural areas. The results presented in the next section indicate significant regional differences.

ease with which a worker can commute to other labor markets. These two considerations suggest that the variable should have a positive effect on earnings. About one-fourth of rural women in our sample were residing in a village with a road. The village-level agricultural wage for women presumably measures their average labor productivity in farm-related work. If the agricultural wage is also the appropriate measure of the average productivity of female labor in the community, the higher this wage is, the higher the earnings of female workers.

DETERMINANTS OF LABOR FORCE PARTICIPATION AND EARNINGS

This section presents the results obtained by applying the model described above. Results are presented first for all Peru, and then separately for Lima, other urban areas, and rural areas. Discussion of the primary focus of our analysis--the labor market returns to education--is reserved for the next, and concluding, section.

Labor Force Participation

The results in table 7 for the countrywide and regional estimates generally indicate that education and training, marital status and household composition, and the presence of other income sources are important determinants of women's labor force participation. Because the probability of participation is not linear in the probit estimates, the table presents slope coefficients, which indicate the marginal change in the probability of participation, for the mean values of the regressors.

The Schooling Variables. Years of schooling appears to have a very small and negative effect on labor force participation. Alternative specifications that allow for nonlinearity or nonmonotonicity (such as splines and school-completion dummy variables at each level) did not produce larger or more significant results. Receiving a postsecondary diploma raises participation rates sharply, however, especially in urban areas. At the mean value of this regressor, having a diploma raises participation by 18 percent in the country as a whole, by 27 percent in Lima, and by 16 percent in other urban areas; the diploma has no evident effect on labor force participation in rural areas, however. Also, except in rural areas, postschool training has a large, positive effect. For the country as a whole, women who attended a training course outside school have 13 percent greater likelihood of being in the labor force. The effect is larger in Lima than in other urban areas. This effect weakens very slowly over time, as suggested by the years-since-training variable, but the employment benefit from training persists over a long period.

Table 7
Probit Estimates for Labor Force Participation by Region of Residence

Variables	All Peru		Lima		Other Urban		Rural	
	α[1]	Slope[2]	α[1]	Slope[2]	α[1]	Slope[2]	α[1]	Slope[2]
Intercept	0.789	0.229	0.414	0.136	0.740	0.229	1.99	0.287
	(6.70)		(2.21)		(4.37)		(7.32)	
Age splines: 20-24	0.090	0.026	0.140	0.046	0.037	0.012	0.098	0.014
	(3.83)		(3.58)		(1.01)		(1.88)	
25-34	0.024	0.007	0.029	0.010	0.043	0.013	-0.022	-0.003
	(2.68)		(1.93)		(3.15)		(-1.10)	
35-44	-0.008	-0.002	-0.028	-0.009	0.006	0.002	0.022	0.003
	(-0.90)		(-1.84)		(0.42)		(1.12)	
45-59	-0.019	-0.005	-0.022	-0.007	-0.017	-0.005	-0.026	-0.004
	(-2.49)		(-1.75)		(-1.41)		(-1.56)	
Years of schooling	-0.036	-0.010	-0.029	-0.010	-0.032	-0.010	-0.027	-0.004
	(-4.88)		(-2.37)		(-2.98)		(-1.29)	
Received a diploma	0.636	0.185	0.836	0.273	0.516	0.160	-0.113	-0.016
	(6.34)		(5.27)		(3.57)		(-0.23)	
Received training	0.435	0.126	0.524	0.171	0.390	0.121	-0.299	-0.043
	(6.67)		(5.75)		(3.73)		(-1.02)	
Years since training	-0.010	-0.003	-0.007	-0.002	-0.009	-0.003	0.032	0.005
	(-2.27)		(-1.32)		(-1.19)		(1.08)	
Total aged 0-4 in household	-0.018	-0.005	0.012	0.004	0.009	0.003	-0.090	-0.013
	(-0.75)		(0.28)		(0.26)		(-1.83)	
Total aged 5-11 in household	0.010	0.003	0.014	0.005	-0.004	-0.001	-0.003	0.000
	(0.53)		(0.44)		(-0.12)		(-.06)	
Total aged 12-18 in household	0.056	0.016	0.076	0.025	0.108	0.033	-0.012	-0.002
	(3.15)		(2.51)		(3.95)		(0.30)	
Females aged 20-59 in household	-0.069	-0.020	0.019	0.006	-0.157	-0.049	-0.175	-0.025
	(-2.94)		(0.56)		(-3.97)		(-2.58)	
Males aged 20-59 in household	-0.113	-0.033	-0.035	-0.011	-0.182	-0.056	-0.137	-0.020
	(-4.75)		(-0.95)		(-4.82)		(-2.04)	
Total aged 60+ in household	-0.109	-0.032	-0.090	-0.029	-0.074	-0.023	-0.183	-0.026
	(-3.07)		(-1.51)		(-1.33)		(-2.31)	
Married	0.073	0.021	0.144	0.047	0.104	0.032	-0.188	0.027
	(0.67)		(0.71)		(0.63)		(-0.81)	
Spouse's age	-0.004	-0.001	-0.009	-0.003	-0.004	-0.001	0.004	0.001
	-1.57		(-2.18)		(-1.26)		(0.084)	
Spouse's years of schooling	-0.025	-0.007	-0.014	-0.005	-0.014	-0.004	0.007	0.001
	(-3.83)		(-1.19)		(-1.32)		(0.38)	
Spouse's hourly wage	-0.001	0.000	-0.012	-0.004	-0.014	-0.004	0.000	0.000
	(-2.15)		(-2.58)		(-3.94)		(0.19)	
Annual family remittances x 1000	-0.008	-0.002	-0.012	-0.004	-0.022	-0.007	-0.064	-0.009
	(-1.46)		(-1.83)		(-1.63)		(-0.93)	
Annual unearned income x 1000	-0.006	-0.002	-0.014	-0.004	-0.003	-0.001	-0.027	-0.004
	(-2.86)		(-3.45)		(-1.06)		(-1.77)	
Lima	-0.075	-0.022						
	(-1.62)							
Rural	0.587	0.170						
	(8.23)							
Paved, gravel, dirt road	0.198	0.058					0.168	0.037
	(1.78)						(1.45)	
Village mean female wage x 1000	-0.054	-0.016					-0.041	-0.006
	(-0.95)						(-0.68)	
	(8.23)							
Log-likelihood	-2681.0		-988.0		-1112.0		-512.2	

1/ Numbers in parentheses are t-values of coefficients.

2/ Slopes are computed at the mean values of the variables.

Household Characteristics. The number of children younger than 12 present in the home does not appear to affect the probability of labor force participation by adult women; the variable has a weakly significant, negative coefficient only in the rural estimates. This result differs from previous studies (e.g., Castañeda, 1986, and Danes et al., 1985), which found that the presence of young children inhibits the labor force participation of women. Our result may have two explanations. First, a greater number of young children increases the dependency rate in the household, raising the marginal utility of income and providing an inducement for market work. Second, the number of family members aged 12-19--potential substitutes for the mother in child care--has a positive (though small), statistically significant effect on participation. The coefficient of the number of other adults aged 20 and above is negative, however, which suggests a different type of substitution--that among adult household members with respect to labor supply. Thus, the presence of other adults tends to reduce the likelihood that women will enter the labor market.

Being married increases slightly the probability that a woman will be in the labor force, but the results are not statistically significant. The husband's characteristics also have a very small impact on a wife's participation. Given the woman's age, the older her husband, the smaller the probability of her labor force participation. Husband's education also has very small, negative effect. The cross-substitution effect between husband's and wife's market work as suggested by the coefficient on the husband's hourly earnings is negative but negligible.

The family's unearned income has the expected negative income effect on women's labor force participation. An increase of 1,000 Intis (or $50) in the family's yearly unearned real income will decrease the participation rate of an adult female member by 0.2 percent, on average.

Rural Community Characteristics. In villages with any kind of road (paved, gravel, or dirt), women tend to have about 4 percent higher labor force participation. Only about 25 percent of rural women in the sample were reported to be residing in such villages. Women in villages where a higher

mean female agricultural wage prevails have slightly lower participation rates; this result, however, is not statistically significant.

Participation in Paid Employment

As in the labor force participation estimates, age, household characteristics, the family's unearned income, place of residence, and education and training influence a woman's participation in paid employment (table 8). The most notable differences between the two participation decisions pertain to the effect of schooling. First, except for degree holders, educational attainment appears to have a negative effect on labor force participation, whereas it has a positive, though small, influence on participation in paid employment. In rural areas, where only one-fifth of the labor force is in paid employment, an additional year of schooling has the largest impact on the probability of being a paid worker, increasing it by 2 percent (computed at the mean schooling level of about two years in rural areas). Secondly, having a diploma has a much larger effect on the probability of paid employment than on that of labor force participation. This difference is most striking in other urban areas and rural areas. In urban areas outside Lima, women with a postsecondary degree are 27 percent more likely to engage in paid work than those without. For rural women, a diploma does not increase overall labor force participation, but it influences their occupational distribution by raising the probability of paid employment by 21 percent.

Table 8
Probit Estimates for Participation in Paid Employment by Region of Residence

Variables	All Peru		Lima		Other Urban		Rural	
	α[1]	Slope[2]	α[1]	Slope[2]	α[1]	Slope[2]	α[1]	Slope[2]
Intercept	-0.199	-0.079	0.065	0.025	-0.252	-0.100	-0.613	-0.203
	(-1.89)		(.36)		(-1.53)		(-2.90)	
Age splines: 20-24	0.103	0.041	0.132	0.050	0.052	0.021	0.136	0.045
	(4.51)		(3.50)		(1.40)		(2.85)	
25-34	0.041	0.016	0.022	0.008	0.074	0.030	0.020	0.007
	(5.12)		(1.52)		(5.78)		(1.32)	
35-44	-0.001	0.000	-0.016	-0.006	0.003	0.001	0.018	0.006
	(-0.11)		(-1.09)		(0.20)		(1.30)	
45-59	-0.018	-0.008	-0.034	-0.013	-0.025	-0.010	-0.005	-0.002
	(-2.85)		(-2.62)		(-2.25)		(-.39)	
Years of schooling	0.010	0.004	-0.005	-0.002	0.007	0.003	0.054	0.018
	(1.41)		(-0.43)		(0.067)		(3.29)	
Post-secondary diploma	0.654	0.260	0.761	0.293	0.685	0.273	0.833	0.210
	(6.88)		(5.27)		(4.91)		(1.39)	
Received training	0.390	0.156	0.423	0.162	0.332	0.132	0.097	0.032
	(6.43)		(4.91)		(3.37)		(0.42)	
Years since training	-0.005	-0.002	-0.004	-0.001	-0.002	-0.001	0.021	0.007
	(-1.26)		(-0.66)		(-0.21)		(1.14)	
Total aged 0-4 in household	0.014	0.006	0.024	0.009	0.039	0.015	0.005	0.002
	(0.68)		(0.60)		(1.12)		(0.13)	
Total aged 5-11 in household	-0.002	-0.001	0.028	0.011	-0.040	-0.016	0.007	0.002
	(-0.11)		(0.94)		(-1.44)		(.21)	
Total aged 12-19 in household	0.074	0.030	0.060	0.023	0.132	0.052	0.007	0.002
	(4.74)		(2.08)		(5.29)		0.025	
Females aged 20-59 in household	-0.064	-0.026	-0.050	-0.019	-0.092	-0.037	-0.065	-0.022
	(-2.83)		(-1.53)		(-2.34)		(-1.11)	
Males aged 20-59 in household	-0.132	-0.053	-0.063	-0.024	-0.203	-0.081	-0.192	-0.064
	(-5.72)		(-1.76)		(-5.36)		(-3.35)	
Total aged 60+ in household	-0.081	-0.032	-0.035	-0.014	-0.082	-0.033	-0.124	-0.041
	(-2.44)		(-0.62)		(-1.52)		(-1.87)	
Married	-0.236	-0.094	-0.209	-0.080	-0.171	-0.068	-0.307	-0.102
	(-2.43)		(-1.11)		(-1.10)		(-1.72)	
Spouse's age	-0.008	-0.003	-0.008	-0.003	-0.010	-0.004	-0.005	-0.002
	(-3.82)		(-1.85)		(-3.28)		(-1.39)	
Spouse's years of schooling	-0.001	-0.000	-0.013	-0.000	0.012	0.005	-0.008	-0.003
	(-0.08)		(-0.11)		(1.25)		(0.053)	
Spouse's hourly wage	-0.013	-0.005	-0.025	-0.010	-0.011	-0.004	-0.001	0.000
	(-4.35)		(-3.86)		(-3.06)		(-.40)	
Annual family remittances x 1000	-0.007	-0.003	-0.008	-0.003	-0.010	-0.004	-0.033	-0.011
	(-1.37)		(-1.24)		(-0.70)		(-0.56)	
Annual unearned income x 1000	-0.014	-0.005	-0.012	-0.005	-0.023	-0.009	-0.018	-0.006
	(-4.44)		(-2.85)		(-3.18)		(-1.18)	
Lima	0.176	0.070						
	(3.97)							
Rural	-0.444	-0.177						
	(-7.67)							
Paved, gravel, dirt road	0.233	0.093					0.197	0.066
	(2.95)						(2.43)	
Village mean female wage x 1000	-0.069	-0.027					-0.079	-0.026
	(-1.57)						(-1.74)	
Log-likelihood	-3496.3		-1104.7		-1310.7		-1025.0	

1/ Numbers in parentheses are t-values of coefficients.

2/ Slopes are computed at the mean values of the variables.

Being married decreases by about 10 percent the probability that a woman will be employed in paid work. This suggests that paid employment, which is more likely to have fixed hours and to take place away from home, may indeed be less compatible with home production and child care. Spouse's characteristics influence the wife's probability of paid employment only to a small degree. Regional differences capture what we already know from Figure 1, that is, that a larger proportion of women are in paid employment in Lima than in other urban or in rural areas. Among rural women, those living in communities that have a paved or gravel road are more likely to be paid workers.

Earnings Function--Non-education Determinants

The coefficient of λ indicates that estimating the wage function only for women who were employed in paid jobs results in positive selection bias. In other words, estimating the earnings function without correcting for selection bias results in biased coefficients for the variables included. For the all-Peru sample, comparing the estimates with and without the selection bias reveals significantly different coefficients for the diploma variable. Correcting for selection into paid employment, we obtain higher returns to postsecondary level education (appendix table B.3). The regional estimates indicate that this bias is statistically significant only for the subsample of women residing in urban areas outside Lima. The results for Lima and for rural women suggest that the wage relationship estimated for those employed in paid jobs is not different from that existing (but not observed) for other women.[13/]

[13/] The findings of past studies on Latin American women have been mixed with respect to the importance of the selectivity bias issue in wage estimation. For example, Mohan (1986) found mild evidence of sample selection bias. He concludes that women with higher education who do in fact work are those with a higher propensity to work. Thus, without the sample selection correction, the returns to education are exaggerated The bias is least among prime-age unmarried women, that is, women with the least choice in their decisions to work or not to work.

Table 9

Estimates for Hourly Earnings By Region

	All Peru		Lima		Other Urban		Rural	
Variables	β	t-value	β	t-value	β	t-value	β	t-value
Intercept	-0.624	-3.80	-0.314	-1.55	-0.861	-3.76	-1.006	-1.98
Age splines:								
ages 20-24	0.089	2.39	0.081	2.36	0.080	1.68	0.046	0.46
Ages 25-34	0.033	3.60	0.029	2.47	0.040	2.58	0.026	1.07
Ages 35-44	0.019	2.22	-0.008	-0.86	0.029	2.14	0.042	1.83
Ages 45-59	-0.001	-0.02	-0.019	-1.44	-0.004	-0.34	0.010	0.48
Primary school	0.120	8.87 1/	0.075	3.60	0.146	7.27	0.095	2.57
Secondary general	0.078	2.03	0.083	0.29	0.066	2.56	0.025	0.28
Secondary technical	0.085	1.19	0.068	0.20	0.109	0.73	2/	2/
Tertiary Nonuniveraity	-0.049	-2.99	0.001	0.74	-0.040	-2.56	-0.398	-1.06
University	-0.040	-4.00	0.032	0.62	-0.083	-3.68	-0.314	-1.50
Received a diploma	0.388	2.81	0.232	1.43	0.326	1.51	2.034	2.24
Received training	0.092	1.26	0.094	1.06	0.225	2.00	-0.563	-1.45
Years since training	0.001	0.24	0.006	1.10	-0.013	-1.73	0.040	1.52
Years in present job (tenure)	0.012	1.75	0.030	2.30	0.031	2.69	-0.054	-3.26
Tenure-squared (x 100)	-0.084	-4.42	-0.044	-0.89	-0.141	-3.88	0.040	1.00
Job is seasonal	0.152	1.37	-0.154	-0.82	0.134	0.85	0.489	1.84
Belongs to a union	0.271	2.95	0.145	1.47	0.347	2.09	0.566	0.74
Has a contract in present job	0.077	0.96	0.049	0.55	0.164	1.24	0.289	0.51
Firm is a private enterprise								
1-10 employees	-0.121	-1.61	-0.083	-0.87	-0.245	-1.98	0.042	0.19
11-100 Employees	0.333	3.32	0.222	1.98	0.366	2.04	1.006	2.33
> 100 Employees	0.427	3.23	0.359	2.59	0.510	2.03	0.974	1.00
Firm is a state enterprise	0.459	2.44	0.533	2.32	0.293	1.11	-	-
Firm is government	0.297	2.97	0.284	2.39	0.218	1.22	0.357	0.60
Boss is a relative	0.191	1.44	0.087	0.56	0.254	1.19	0.526	1.03
Been ill during last 4 weeks	-0.057	-1.34	-0.015	-0.26	-0.107	-1.61	-0.064	-0.55
Lima	0.107	2.12						
Rural	-1.012	-11.36						
Paved, gravel, dirt road	0.250	2.22					0.205	1.43
Village mean female wage (x 100)	0.021	3.37					0.012	1.48
Lambda	0.223	2.21	0.183	1.21	0.381	2.60	0.178	0.73
Adjusted r-squared	0.371		0.210		0.238		0.211	

1/ The t-values for schooling splines secondary general to university indicate whether the estimated coefficients are statistically different than that estimated for primary education. All other t-values in the table indicate statistically significant difference from zero.

2/ Because very few rural women obtained secondary technical education, this variable is combined with that for secondary general education.

Life Cycle Effects. The age profile for working women's wages indicates that hourly earnings rise fastest between the ages of 20 and 24, increasing up to age 44 at a diminished rate and declining thereafter. This

profile is not unlike that for males, as estimated by Stelcner et al. (1987). Using a quadratic specification of potential years of experience, they found that wages for men increase at a diminishing rate, peaking in the same age group (at age 37 on average for all Peru but at 41 for Lima) before decreasing. As discussed earlier, because women have more frequent spells of being out of the labor force than men, the age coefficients for women cannot be interpreted primarily as returns to work experience. Although age remains the best indicator available for total labor market experience, what it probably measures more closely is the impact of marriage, childbearing, and childrearing on women's labor supply over the life cycle. Interruptions in labor force participation due to these factors are likely to affect the earnings profile.

Job Tenure. In the absence of data on on-the-job training, job tenure, or the number of years worked in the present job, provides a rough measure of a worker's job-specific knowledge and skills. It also measures the impact of seniority on wages. The results indicate that hourly earnings rise at a rate of 3 percent for each additional year in a job in Lima and other urban areas, with this effect tapering off over time. In contrast, in rural areas, those who hold a job the longest earn the least, and that seasonal jobs tend to pay better than regular work. In periods of peak labor demand, women in seasonal jobs earn about 50 percent more than year-round workers.

Job Characteristics. The type of employer and size of the (private) firm make a difference in how much women are paid. We used the family enterprise as the reference firm category in the earnings regressions and distinguished among three types of private firms, grouped according to number of employees, and between two types of government-related firms, the state enterprise or corporation and public administration (government). The results imply that hourly earnings of women employed in family enterprises (who are therefore self-employed) and small private firms are not significantly different. The larger the private firm, the greater the hourly earnings relative to self-employed workers. Firms with 11 to 100 employees pay 33 percent more than family enterprises, whereas firms with more than 100 workers pay 43 percent more. This pattern emerges in all the regional estimates, but

in rural and other urban areas the wage gap between larger private firms and family enterprises is substantially wider than it is in Lima. On average, women working for a state enterprise or the government will earn 46 or 30 percent more, respectively, than if they were self-employed. This pay differential is most evident in the urban areas, where nearly all government employees reside; in our sample, half of all women working for the government are in Lima.

A job contract and union membership imply higher wages, ceteris paribus. In the all-Peru regression, having a work contract means receiving 8 percent more pay. Belonging to a union has an even greater impact: union members tend to receive more than 27 percent higher wages than nonmembers. This effect is large and statistically significant in urban areas outside Lima, where 15 percent of the wage-earning women in the sample belonged to a union. Although the rural union effect is largest, it is statistically insignificant, probably because only 1 percent of the sample belonged to a union. Of course, here we have chosen to ignore the fact that union membership is itself a choice made by the worker, and thus, could bias these coefficient estimates.

Regional Differences. Holding other factors constant, place of residence significantly determines earnings. Women with exactly the same individual characteristics and similar jobs would earn 11 percent more if they live in Lima than in any other city and twice as much if they live in an urban area outside Lima rather than in a rural area. Among rural women, those residing in communities with a road or in higher wage areas tend to earn greater pay.

DOES EDUCATION PAY IN THE LABOR MARKET?

The commonly used indicator for assessing the benefits from education in the labor market is the rate of return computed from an earnings function. Our estimates of the rates of return to education and training are summarized in table 10. At the primary level, these results are similar to those obtained by Stelcner et al. (1987) for Peruvian men and by Mohan (1986) for women in Cali, Colombia, but they are lower than the 32 percent private rate of return Psacharopoulos (1985) reported for all of Latin America. At the secondary level, our results appear to be higher than those of Stelcner et al., about the same as those of Mohan, and lower than the 23 percent Psacharopoulos reported. Overall, we find no significant difference in the rates of return to technical secondary education and general education. Moock and Bellew (1988) reached the same conclusion for Peruvian men employed in the urban wage sector, but they found significantly higher returns to technical education for self-employed men in Lima.

Table 10
Rates of Return to Schooling and Training
by Region of Residence
(in percent)

Education level/ training	All Peru	Lima	Other Urban	Rural
Primary	12.0*	7.5*	14.6*	9.5*
Secondary				
General	7.8*	8.3	6.6*	2.5
Technical	8.5	6.8	10.9	-
Tertiary				
Nonuniversity	-4.9*	0.1	-4.0*	
With diploma	19.2*	23.6	16.6	1/
University	-4.0*	3.2	-8.3*	1/
With diploma	22.8*	36.0	-0.6	1/
Training	9.2	9.4	22.5*	1/ -56.3

Note: * indicates statistical significance of 5 percent or better; based on results in Table 11.

1/ Fewer than ten observations.

Both schooling and out-of-school training increase wages. The results indicate that, in paid employment, the average rate of return to primary education is about 12 percent. This is significantly larger than the rate of return estimated for secondary and postsecondary education. The rate of return to secondary general education is 8 percent as compared with 5 percent for technical education at the same level.[14/] The estimated rates of return to postsecondary education without receiving a diploma are negative for both nonuniversity tertiary and university education-- -5 and -4 percent a year, respectively. Gaining a diploma greatly increases the return to postsecondary education; the rate of return to earning a diploma is 19 percent in the all-Peru estimates.

These results vary by region. The rural coefficients for the tertiary level should be ignored because they refer only to a minuscule fraction of the population. For Lima, women with completed postsecondary degrees could realize a return of 19-23 percent depending on whether they attended a university or not. In other urban areas, whereas a nonuniversity tertiary graduate could realize a rate of return of 16 percent (which is not significantly different than the return in Lima), a university graduate will earn a zero rate of return for her postsecondary educational investment.

The estimates imply a 9 percent return to postschool training for the country as a whole. This effect is largest in other urban areas, where 34 percent of the women who earn wages have attended postschool training. The return is negative in rural areas, where only 7 percent have had training. Except in rural areas, these returns (though mostly imprecisely estimated) compare favorably with returns to secondary and postsecondary education. Moreover, the number of years since training does not appear to diminish this effect quickly. These results, however, do not imply that attending a

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[14/] The study by Stelcner et al. (1987) on the determinants of wages of men working in Peru's private sector found that the estimated pattern of rates of return to education is similar to that found in other Latin American countries--10 percent for a year of primary schooling, 6 percent for secondary education, and 8 percent for postsecondary schooling. Our results for women differ from these estimates for men primarily with respect to postsecondary education.

postschool training course would substitute for secondary schooling. Using as an indicator the distribution of trainees by formal schooling completed, women apparently enroll in training courses to enhance or complement, rather than substitute for, their formal education.[15/] Perhaps too, the similarity of results for education and for training reflects the gap between the skills taught in schools and those needed in the labor market.

Nonwage Influences on Education

The past two decades have seen rapid growth in tertiary education in Peru, centering around universities in Lima. In the period 1960-84, the number of state universities grew from nine to twenty-seven, and private universities from one to sixteen. Women have taken part in the rise in postsecondary enrollment. In 1981, 9 percent of all women over age 15 had completed some postsecondary education, compared to 3 percent in 1972 and 1 percent in 1961 (Fernandez, 1986). This rise in postsecondary education is puzzling given our estimates of low or negative returns to postsecondary education (unless a woman actually completes the degree and obtains a diploma).[16/] Why then do women invest in higher education? Are the unmeasured, nonpecuniary (nonlabor market) returns to higher education large enough to induce women to pursue it? If so, standard rates of return estimates are not sufficient to assess the full benefits of higher education for women.

The stagnation of the Peruvian economy during the last fifteen years, along with high inflation rates, has had serious consequences for the labor market and thus have affected choices individuals or families make about human capital investment. The decline in savings and worsening expectations have drastically curtailed capital investments. Viewed against this

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[15/] Arriagada (1988), also using PLSS data on urban women, found that women with secondary or higher education are the most likely to obtain out-of-school training.

[16/] Note that for Peruvian men, Stelcner et al. found rates of return of about 8 percent in urban areas and about 30 percent in rural areas.

background, greater demand for education is perhaps not surprising. In spite of growing unemployment and underemployment, education is one form of investment that inflation does not devalue intrinsically. It is also one that different government administrations have actively encouraged and subsidized. It has been argued, however, that the expansion of university enrollment may have been achieved at the expense of a decline in the quality of graduates, thus worsening unemployment among those with postsecondary education. In addition, the labor market squeeze and the growing supply of more workers with postsecondary education may have led employers to impose more selective hiring policies such as requiring diplomas or postschool training to supplement formal schooling.

Participation Effects of Education

The effect of education and training on hourly earnings is only one dimension of their impact in the labor market. Consider again our results on the effect of education and training on the labor force participation of women. From the probit estimates presented earlier, we computed predicted probabilities by region and age cohort to determine the varying impact of these factors on different groups of women. Using selected counterfactual scenarios, we examined the degree to which additional years of schooling or receiving a diploma or attending a training program would change labor force participation and the probability of paid employment. These counterfactual simulations use hypothetical values for years of schooling or postschool training for certain women. For example, table 11 displays the predicted changes in labor force participation if years of schooling or the number of women with training were different. The counterfactual simulation results labeled "If all have at least 5 years of schooling" are computed by assigning five years of schooling to women with less than five years of schooling and retaining the actual years of schooling for the rest. The mean change in predicted labor force participation is calculated by using the probit coefficients and then taking the average change over the sample.

Table 11
Education Level Simulations: Mean Predicted Probabilities of Labor Force Participation: for Full-Sample Age Cohorts by Region of Residence

Scenario/Cohorts	All Peru	Lima	Other Urban	Rural
Actual Values				
Ages 20-24	0.678	0.666	0.556	0.819
Ages 25-34	0.777	0.782	0.678	0.883
Ages 35-44	0.827	0.758	0.795	0.904
Ages 45-59	0.766	0.602	0.724	0.901
Counterfactual values				
If all have at least 5 years of schooling				
Ages 20-24	-0.006	-0.001	-0.005	-0.011
Ages 25-34	-0.008	-0.002	-0.007	-0.015
Ages 35-44	-0.013	-0.006	-0.011	-0.018
Ages 45-59	-0.024	-0.011	-0.023	-0.021
If all have at least 10 years of schooling				
Ages 20-24	-0.030	-0.010	-0.030	-0.041
Ages 25-34	-0.034	-0.016	-0.034	-0.041
Ages 35-44	-0.046	-0.032	-0.042	-0.045
Ages 45-59	-0.070	-0.047	-0.070	-0.048
If all have postschool training				
Ages 20-24	0.081	0.084	0.089	-0.048
Ages 25-34	0.057	0.052	0.072	-0.038
Ages 35-44	0.055	0.068	0.063	-0.036
Ages 45-59	0.076	0.100	0.086	-0.037

Table 11 highlights the impact that schooling and training have on female labor force participation in Peru. If all women had at least five years of schooling, labor force participation would be lower, but mainly among rural and older women who have less schooling in general. Increasing the level of education of the least-educated women to ten years results in even

less labor force participation, with the effect being largest for the oldest group in other urban areas and smallest for younger women in Lima. The effect of augmenting the education of the least educated on the probability of paid employment is opposite in direction and larger in magnitude, but again mainly among rural women (table 12). Improving the education of the least educated in rural areas to five or ten years raises the proportion of employed women working in paid jobs.

The effect of having all women attend a postschool vocational training program would be to increase labor force participation for all except rural women. The impact of training on rural women is to reduce labor force participation rates by 4 percent while raising the probability of paid employment by 5 percent. Partly because most available training programs prepare women for nonagricultural employment and because training raises the reservation wage of women, rural women with training are less willing to be unpaid family workers. That training programs available to women may not be directly useful to most rural jobs is borne out by the fact that most women in Peru received job training in institutions ("academias") that provide clerical and office skills (Arriagada, 1988). Training also increases the overall labor force participation of urban women, but the distribution of type of employment does not shift, except among older women in cities outside Lima.

Table 12

Education Level Simulations: Mean Predicted Probabilities of Paid Employment for Full-Sample: Age Cohort by Region and Residence

Scenario/Cohort	All Peru	Lima	Other urban	Rural
Actual Values				
Ages 20-24	0.367	0.539	0.321	0.207
Ages 25-34	0.462	0.630	0.453	0.259
Ages 35-44	0.486	0.588	0.584	0.282
Ages 45-59	0.370	0.406	0.424	0.285
Counterfactual values				
If all have at least 5 years of schooling				
Ages 20-24	0.002	0.000	0.001	0.025
Ages 25-34	0.004	0.000	0.002	0.048
Ages 35-44	0.008	-0.002	0.004	0.070
Ages 45-50	0.008	-0.002	0.006	0.080
If all have at least 10 years of schooling				
Ages 20-24	0.008	-0.002	0.005	0.094
Ages 25-34	0.013	-0.003	0.008	0.136
Ages 35-44	0.020	-0.007	0.012	0.170
Ages 45-59	0.022	-0.008	0.016	0.179
If all have postschool training				
Ages 20-24	0.086	0.075	0.075	0.040
Ages 25-34	0.084	0.055	0.075	0.046
Ages 35-44	0.100	0.070	0.085	0.051
Ages 45-59	0.109	0.086	0.099	0.052

What is a postsecondary diploma worth? Our probit coefficients indicate that women with diplomas tend to have much higher labor force participation rates and probability of paid employment than other women. To illustrate this, we select out the sample of women with at least 14 years of

schooling (table 13). Not all of these women earned a diploma. If all had, labor force participation rates and the probability of paid employment would be higher, but mainly for younger women. The effect on paid employment is largest for Lima women. Because some women in the youngest category are still in school, part of the observed effect is really due to completion of a postsecondary degree.

The diploma effect probably reflects several factors. The high cost of acquiring accurate information about the productivity of prospective employees has led employers to rely on diplomas as a signal of the job-preparedness of possible hires. As a result, well-paying jobs that make employment worthwhile may be available only to those with a diploma, thus, keeping other highly educated women out of paid jobs. Moreover, the tighter labor market in Peru and its expanded supply of better-educated workers in recent years means that employers can reduce hiring costs and risks, without an offsetting increase in wages, by requiring diplomas when they first sample from the labor queue. In the face of employer preference for male workers, a postsecondary diploma would be even more important for women in this context.

In general, we conclude that education and training do enhance the contribution of women in the labor market. Whereas education does not increase the number of Peruvian women in the labor force monotonically, it alters the occupational distribution of female workers by increasing the proportion of women in paid employment. Among those employed, education is positively related to hourly earnings, but the relationship is nonlinear--primary education produces higher rates of return than secondary education. The returns to postsecondary education appears to be low and negative, except for the small fraction of women who have earned a diploma.

APPENDIX A

A REVIEW OF PAST STUDIES ON FEMALE LABOR SUPPLY IN LATIN AMERICA

Although the economic and policy environment in Peru is not identical to that of other Latin American countries, the findings of past studies that have estimated labor force participation and earnings equations for women provide specific hypotheses that we explored in this study. The studies are part of a growing body of knowledge about the labor supply behavior and incomes of women in developing countries. The review is not exhaustive; it focuses on recent research and on findings pertaining to the role of education and training (see Appendix Table A.1)

Female Labor Force Participation

Five recent studies that have estimated labor force participation equations for Latin American women are those of Behrman and Wolfe (1984) on Nicaragua, Danes et al. (1985) on Honduras, Castañeda (1986) and Mohan (1986) on Colombia, and Castañeda (1986) on Chile. See Table A.2 for the findings of these different studies. These studies define labor force participation as a binary variable taking the value 0 or 1 and estimate the relationship using either OLS or probit models.[17/]

A principal finding from these studies is that education has a positive impact on female labor force participation. In different specifications of the education variable, however, the effect appears to be nonlinear and even nonmonotonic.[18/] In Santiago, Chile, Castañeda found that married women with no schooling and those with more than thirteen years of

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[17/] The most important criticism of OLS estimates of this relationship is that the conditional expectations from the estimates, which are interpreted as the probability that a woman will enter the labor force, can lie outside the limit (0,1). Nevertheless, OLS regressions will still provide unbiased, though not generally efficient, estimates of the coefficients of the included variables.

[18/] Studies on Asian women have also found a similar nonmonotonic relationship between education and labor force participation (Paqueo and Angeles, 1980; Nitungkorn, 1982; Canlas and Razak, 1980).

education tend to have larger probabilities of participating in the labor market than women with primary or secondary education. This strongly nonmonotonic relationship between education and labor force behavior is different from that found in some other countries, where participation rises, though in a nonlinear fashion, with educational level. For example, in contrast to Chile, Castañeda's estimates for married women in urban Colombia show a positive and statistically significant relationship between years of schooling and labor force participation.[19] Similarly, in Honduras, Danes et al. found that an additional year of schooling increases the labor force participation of women in the formal sector by 12 percent; they define formal sector work as relatively permanent, income-earning work such as wage employment in a factory or a farm, practice of a profession, or management of a business.[20]

Mohan also has estimated labor force participation functions for Colombia's urban women. Separate estimates for young unmarried women aged 15-24, unmarried women aged 25-54, and married women of all ages with husband present yield interesting differences. Among young women, one more year of schooling decreases participation by about 1 percent, a result indicating that these women are still going to school. Education has a positive effect on participation for older and married women. One more year of schooling tends to increase participation by 1.4 percent among unmarried prime-age women and by 3.1 percent among married women. For all three groups, Mohan found that the higher the family income the lower the probability of participating in the market sector.

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[19] Castenada found that, as with Chilean women, the number of young children (under age three) has a strong negative impact on labor force participation. Husband's education also has a negative effect on women's participation. Although the author interpreted this result as showing a negative income effect, it can also be interpreted as suggesting labor substitution or specialization in the family between husband and wife.

[20] Another variable that they found to exert a significant effect is the number of children between one and two years old; one more toddler in the home decreases a mother's labor force participation by 27 percent.

Behrman and Wolfe's labor force participation results differ widely between rural and urban areas and between the formal and informal sectors. Their estimates suggest that more schooling increases participation in urban areas but not in rural areas. They also found a nonlinear relationship between education and participation. Their estimates for the quadratic term, years of schooling squared, indicate that the effect increases at higher levels of schooling. Within each region, they found that more schooling leads to a significantly higher probability of being in the formal sector and a lower probability of working elsewhere.

Women's Earnings

Behrman et al. (1985), Lamas and Musgrove (1982), and Mohan (1986) estimated earnings functions for women in Nicaragua, Peru, and Colombia, respectively (see Table A.3). Behrman et al. defined wages as earnings (including in-kind payments) per fortnight; Lamas and Musgrove estimated an annual earnings function; Mohan estimated both monthly earnings and hourly wage functions. Like the present study, Behrman et al. and Mohan corrected for sample selection bias due to observing wages only for women working in the market sector at the time of the survey. Behrman et al. found a statistically significant selectivity bias only for their Managua estimates. Mohan found only a marginally significant selectivity bias for young (ages 15-24) unmarried women; his results indicate that young women, who are more likely to participate in the labor market, earn lower wages.

Behrman et al. found relatively high rates of return to schooling--13 and 12 percent--for women in the central metropolis and other urban samples, in contrast with 5 percent for the rural sample; men had lower rates of return to schooling than women--10, 7, and 4 percent, respectively, in the three regions. Mohan's rates of return for Colombian women--13-14 percent--resemble those of Behrman et al., but his estimate for young unmarried men at 15 percent, was slightly higher, not lower, than that of women. Dividing the female sample by city rather than region and including education as spline variables, Mohan, in the fullest specification of his model, found the following rates of return for women: to primary education, 2 percent in

Bogota and 10 percent in Cali; to secondary education, 12 and 11 percent, respectively; and to higher education, 10 and 16 percent, respectively. The "certification variables" included, defined as dummy variables indicating completion of a school level, are not significant. The rates of return found for men were: in Bogota, 7 percent for both primary and secondary schooling and 10 percent for tertiary education; in Cali, 9, 1[illegible] and 15 percent for the three levels of education, respectively.[21/] In contrast with the results for women, the "certification" variables for men for the secondary and postsecondary levels have large, positive, and statistically significant coefficients. The results indicate that the additional bonus for male workers is about 20 percent for graduating from high school and about 25 percent for graduating from college.

The estimates of Lamas and Musgrove provide average rather than marginal returns by level of schooling. In general, they did not find any significantly higher earnings for women who attended school than for those with zero years of schooling. This perverse result is due to the use of total earnings as the dependent variable, which confounded the effects of education on the probability of labor force participation, hours of work, and wage rates, and ignored the relationship between hours of work and wage rates. These issues tend to be more important when analyzing labor market behavior and outcomes of women than they are for men. For men, they found that only the secondary graduates and those with some university education earned significantly more than those with no schooling.

[21/] Mohan's finding that the rate of return to postsecondary education for women is lower than that for men conflicts with Schultz's (1968) earlier study using 1965 data. Schultz, also studying Bogota men and women, found a rate of 12 percent for women as compared with 5 percent for men. The disparity could be the result of changes in the relative educational attainment of men and women between 1965 and 1978, and/or their relative labor market opportunities.

In summary, past studies on the labor force participation and earnings of Latin American women have found the following relationships: (1) with the exception of Castañeda's findings for Chile, the effect of years of schooling on participation is positive and nonlinear, with the effect being greater at higher levels of schooling; Castañeda found a nonmonotonic (U-shaped) relationship; (2) the impact of education on wages may differ by schooling level; for example, returns are higher in secondary and postsecondary education in Colombia; and (3) the evidence is mixed on whether returns to education are higher for either men or women.

Appendix Table A.1
Selected Studies Estimating Labor Force Participation and Earnings of Women in Latin America

Authors & Date of Publication	Location and sample	Explanatory variables
A. Labor Force Participation		
Behrman & Wolfe (1984)	Nicaragua: 3,773 women ages 15-45 from 1977-78 household survey	Years of schooling, schooling squared; work experience, experience squared; nutrition; days ill; never migrated; children under 5; other income; marital status; mother not housewife; community population; proportion of labor force female
Castañeda (1986)	Santiago, Chile: 549 households from 1981 survey, 1,4443 housewives	Years of schooling; spouses's income; ownership of home appliances; whether domestic worker or other help present; age; income of children and relatives
	Colombia: 2,141 families with wife and husband present from 1977 household survey in four largest cities	Years of education; duration lived in city; number of children under age 3; mean age that children start school; mean spacing between births; number of live births; marital status; husband's education; age; father's occupation
Danes, Winter & Whiteford (1985)	Honduras: Sample of 128 women from 1981 survey	Age; years of schooling; union membership; married; number of infants, toddlers, pre-schoolers; sex of household head
Mohan (1986)	Colombia: 1,807 women in Bogotá, 1,887 women in Cali from 1978 household survey	Age, age-squared; years of education; other family earned and in-earned income; whether household head; marital status; number of children; home activity

Authors & Date of Publication	Location and sample	Explanatory variables
B. Earnings		
Behrman, Wolfe, & Blau (1985)	Nicaragua: Sample of wage earners from 1977-78 household survey: 1,865 women, 1,904 men, aged 15-45	Dependent: Ln(earnings); Number of grades completed; days ill; protein intake; work experience; age, age squared
Lamas & Musgrove (1982)	Lima, Peru: 313 women aged 12 and over from 1968-69 household survey	Dependent: Ln(earnings); Age groups; schooling dummies; type of occupation; marital status; age composition of young children
Mohan (1986)	Colombia: 2219 men and 1,807 women in Bogotá; 946 men and 1,887 in Cali from 1978 household survey	Dependent: Ln(monthly earnings) and ln(hourly wage); Years of schooling in primary, secondary, higher, and post-graduate levels; diploma received; experience, experience squared; place of residence; place of birth; job characteristics (union, contract)

Appendix Table A.2

Effect of Schooling on Female Labor Force Participation: Findings from Past Studies in Latin America

Estimate type and study	Subsample	Participation Results using-- Schooling	t-value	Schooling squared	t-value
OLS estiamtes					
Danes, Winter & Whiteford, 1985 (Honduras)		0.12	(6.51)		
Castañeda, 1986 (Chile)	Years of schooling:				
	0 years	0.222	(1.82)		
	1-4 years	-0.122	(1.89)		
	5-8 years	-0.045	(0.9)		
	13+ years	0.208	(2.41)		
Probit estimates					
Behrman & Wolfe, 1984 (Nicaragua)	Metro area	-0.06	(1.7)	0.01	(3.5)
	Formal sector	0.15	(3.5)	0.004	(1.1)
	Informal sector	-0.05	(1.5)	-0.002	(0.8)
	Other urban areas	0.01	(0.2)	0.01	(2.1)
	Formal sector	0.08	(1.9)	0.01	(2.4)
	Informal sector	0.08	(2.0)	-0.01	(3.3)
	Rural	0.01	(0.2)	0.01	(1.0)
	Formal sector	-0.01	(0.1)	0.02	(1.8)
	Informal sector	0.12	(1.7)	-0.02	(1.8)
Castañeda, 1986 (Colombia)	Age <= 35	0.134	(3.5)		
	Age => 35	0.127	(3.8)		
Mohan, 1986 (Colombia)	Young women, 15-24	-0.008	(2.0)		
	Unmarried women, 25-54	0.014	(2.8)		
	Married women	0.031	(8.8)		

Sources: Castañeda (1986) Chile: Table 2; Colombia: Table 3;
Danes, Winter, & Whiteford (1985): Table 12;
Behrman & Wolfe (1984): Table 4;
Mohan (1986): Tables 7-4 and 7-5.

Appendix Table A.3

Effect of Schooling on Earnings of Women: Findings From Selected Studies in Latin America

Study	Subsample	Ln(earnings)		Ln(hourly wage)	
		Women	Men	Women	Men
Behrman, Wolfe, & Blau, 1985 (Nicaragua)	Metropolis	0.13**	0.10**		
	Other Urban	0.12**	0.08**		
	Rural	0.05	0.04**		
Lamas & Musgrove, 1982 (Peru)	Lima, Peru:				
	Some primary	-0.415	0.399		
	Primary completed	0.152	-0.183		
	Some secondary	0.163	0.318		
	Secondary completed	-1.534	0.552*		
	Some university	0.272	1.171**		
Mohan, 1986 (Colombia)	Bogotá:				
	Primary	0.015	0.071	0.021	-
	Secondary	0.068	0.073	0.117	-
	University	0.056	0.099	0.095	-
	Postgraduate	0.038	0.110	0.436	-
	Cali:				
	Primary	0.072*	0.094*	0.104*	-
	Secondary	0.069*	0.147*	0.106*	-
	University	0.161	0.152*	0.157	-
	Postgraduate	0.202	-0.294*	0.062	-

Sources: Behrman et al., Table 4.
Lamas & Musgrove, Table 3;
Mohan - Bogotá: Women, Table 10.3; Men, Table 8.3;
Cali: Women, Table 10a; Men, Table 8.4.

Notes: * and ** indicate statistical significance at the 5 and 10 percent levels, respectively, in a two-tail test.

Appendix Table B.1

Means and Standard Deviations for Variables in Labor Force Participation Functions by Region

	All Peru		Lima		Other urban		Rural	
Variables	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
IN LABOR FORCE	0.785	0.41	0.709	0.45	0.741	0.44	0.912	0.28
IN PAID EMPLOYMENT	0.447	0.50	0.572	0.49	0.482	0.50	0.284	0.45
AGE SPLINES:								
AGES 20-24	3.585	1.05	3.529	1.11	3.586	1.04	3.639	0.99
AGES 25-34	6.573	4.16	6.227	4.20	6.507	4.18	6.991	4.06
AGES 35-44	3.778	4.41	3.337	4.29	3.682	4.38	4.324	4.49
AGES 45-59	1.820	3.79	1.550	3.61	1.844	3.83	2.059	3.89
YEARS OF SCHOOLING	5.477	4.64	8.083	4.05	6.341	4.51	1.896	2.76
RECEIVED A DIPLOMA	0.058	0.23	0.092	0.29	0.076	0.26	0.005	0.07
RECEIVED TRAINING	0.287	0.45	0.531	0.50	0.283	0.45	0.049	0.22
YEARS SINCE TRAINING	2.673	6.13	5.034	7.82	2.573	5.90	0.456	2.68
TOTAL AGED 0-4 IN HOUSEHOLD	0.781	0.93	0.592	0.87	0.756	0.93	0.996	0.95
TOTAL AGED 5-11 IN HOUSEHOLD	1.098	1.15	0.916	1.12	1.073	1.15	1.305	1.16
TOTAL AGED 12-18 IN HOUSEHOLD	1.136	1.23	1.049	1.22	1.192	1.29	1.159	1.17
FEMALES AGED 20-59 IN HOUSEHOLD	0.653	0.96	0.927	1.16	0.627	0.92	0.412	0.69
MALES AGED 20-59 IN HOUSEHOLD	1.193	0.85	1.316	0.96	1.191	0.87	1.075	0.68
TOTAL AGED 60+ IN HOUSEHOLD	0.291	0.56	0.321	0.60	0.298	0.56	0.254	0.52
SPOUSE'S AGE	26.909	22.32	23.534	22.59	26.749	22.24	30.430	21.61
SPOUSE'S YEARS OF SCHOOLING	4.028	4.68	5.061	5.40	4.597	4.87	2.347	2.89
SPOUSE'S HOURLY WAGE	3.293	25.12	4.392	14.79	3.455	9.06	2.018	40.92
ANNUAL FAMILY REMITTANCES	785.2	3427.6	1670.9	5413.9	583.2	2341.5	144.9	676.0
ANNUAL UNEARNED INCOME	1832.6	8684.0	3405.9	9691.1	1860.7	10736.0	245.6	2435.7
MARRIED	0.660	0.47	0.578	0.49	0.662	0.47	0.738	0.44
LIMA	0.314	0.46						
RURAL	0.317	0.47						
PAVED, GRAVEL, DIRT ROAD							0.242	0.43
VILLAGE MEAN FEMALE WAGE (Intis)							0.709	0.78
SAMPLE SIZE	5777		1812		2131		1834	

Appendix Table B.2

Means and Standard Deviations for Variables in Earnings Function By Region

	All Peru		Lima		Other Urban		Rural	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
LOG (HOURLY WAGE)	0.728	1.35	1.174	1.03	0.894	1.19	0.614	1.47
AGE SPLINES:								
AGES 20-24	3.661	0.85	3.569	1.07	3.711	0.89	3.744	0.77
AGES 25-34	6.780	4.02	6.077	4.15	7.182	3.87	7.388	3.86
AGES 35-44	3.603	4.30	2.835	4.03	3.842	4.30	4.662	4.55
AGES 45-59	1.508	3.40	1.048	2.93	1.623	3.49	2.196	3.91
YEARS OF SCHOOLING	6.507	4.78	8.499	4.12	6.669	4.72	2.214	3.09
RECEIVED A DIPLOMA	0.099	0.30	0.126	0.33	0.116	0.32	0.013	0.12
RECEIVED TRAINING	0.392	0.49	0.605	0.49	0.339	0.47	0.073	0.26
YEARS SINCE TRAINING	3.555	6.66	5.388	7.57	3.108	6.30	0.785	3.62
YEARS WORKING IN PRESENT JOB	7.955	8.75	4.660	6.44	7.316	8.37	15.790	12.97
JOB IS SEASONAL	0.038	0.19	0.024	0.15	0.046	0.21	0.050	0.22
BELONGS TO A UNION	0.137	0.34	0.190	0.39	0.147	0.35	0.013	0.12
HAS A CONTRACT IN PRESENT JOB	0.110	0.31	0.161	0.37	0.106	0.31	0.015	0.12
FIRM IS A PRIVATE ENTERPRISE,								
1-10 EMPLOYEES	0.237	0.43	0.354	0.48	0.188	0.39	0.100	0.30
11-100 EMPLOYEES	0.075	0.26	0.123	0.33	0.054	0.23	0.021	0.14
> 100 EMPLOYEES	0.044	0.21	0.081	0.27	0.027	0.16	0.004	0.06
FIRM IS A STATE ENTERPRISE	0.015	0.12	0.019	0.14	0.019	0.14	-	-
FIRM IS GOVERNMENT	0.128	0.33	0.173	0.38	0.135	0.34	0.023	0.15
BOSS IS A RELATIVE	0.031	0.17	0.041	0.20	0.029	0.17	0.013	0.12
BEEN ILL DURING LAST 4 WEEKS	0.540	0.50	0.560	0.50	0.533	0.50	0.513	0.50
LIMA	0.401	0.49						
RURAL	0.201	0.40						
PAVED, GRAVEL, DIRT ROAD							0.283	0.45
VILLAGE MEAN FEMALE WAGE (Intis)							0.704	0.80
LAMBDA	0.771	0.33	0.607	0.26	0.728	0.31	1.115	0.28
SAMPLE SIZE	2584		1037		1027		520	

Appendix Table B.3

Rates of Return to Schooling and Training With and Without Selection Bias Correction: All Peru Sample (in percentages)

Education Level/ Training	With selection correction	Without selection correction
Primary	12.0*	12.2*
Secondary		
General	7.8*	8.0*
Technical	8.5	8.5
Tertiary		
Nonuniversity	-4.9*	-5.4*
with diploma	19.2*	11.1*
University	-4.0*	-4.3*
with diploma	22.8*	15.5*
Training	9.2	2.5

Note: * indicates statistical significance of 5 percent or better; based on results in table 11.

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